UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/852,376	05/10/2001	Eric A. Jacobsen	884.427US1	5426

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EXAMINER
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ART UNIT	PAPER NUMBER
2667	

DATE MAILED: 12/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
     closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-29</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-29</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

     a)☐ All   b)☐ Some * c)☐ None of:

        1.☐ Certified copies of the priority documents have been received.

        2.☐ Certified copies of the priority documents have been received in Application No. _____.

        3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
            application from the International Bureau (PCT Rule 17.2(a)).

     * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
   Paper No(s)/Mail Date <u>10/15/02; 02/19/04</u>.

4) ☐ Interview Summary (PTO-413)
   Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

1.   Claims 1-29 are rejected under 35 U.S.C. 102(e) as being anticipated by Kadous (US

2001/0036235 A1).

With respect to claims 1, 7, 8, 19, and 25, Kadous discloses in Fig. 1, a functional block

diagram illustrating portions of an orthogonal frequency division multiplexing (OFDM) receiver

100. Herein, a signal r(t) is received, synchronized, corrected, deinterleaved, and decoded. It

should be understood that in an OFDM system, a signal r(t) or OFDM symbol comprises a

plurality of data symbols modulated by different subcarriers and plurality of pilot symbols

(receiving an OFDM symbol from a communication channel, said OFDM symbol having a

plurality of data subcarriers and a plurality of pilot symbols). Kadous discloses on page 3, 32nd

paragraph and Fig. 2, that the least square (LS) channel estimate (pilot vector) is then determined

by performing division on the training sequence (pilot symbols) in LS estimator 56 (generating a

pilot vector using pilot symbols from OFDM symbol). Coefficient interpolator and channel

estimator then multiplies interpolation coefficient for each channel (herein, every channel or

subcarrier is considered as interested subcarrier) (obtaining a first interpolation vector

corresponding to a first subscarrier of interest) by the LS estimator to obtain the final channel

estimates (calculating a dot product of pilot vector and first interpolation vector to generate an

equalization coefficient for first subcarrier of interest).

With respect to claim 2, 9, 17, 24, and 29, Kadous discloses on page 2, 20th paragraph,

that the interpolation coefficient (obtaining an interpolation vector corresponding to each

subcarrier of interest) or interpolator matrix M is determined and multiplied by an LS estimate

for each transmitting antenna to determine the channel estimate for each channel (calculating a

dot product of pilot vector and interpolation vector for each subcarrier of interest to generate an

equalization coefficient for each subcarrier of interest).

With respect to claims 3, 16, 21, and 27, Kadous discloses on page 3, 32nd paragraph and

Fig. 2, that the least square (LS) channel estimate (pilot vector) is then determined by performing

division on the training sequence (pilot symbols) in LS estimator 56 (herein, a set of pilot

symbols is considered as the all the pilot symbols) (generating a pilot vector includes selecting a

set of pilot symbols from OFDM symbol based upon the identities of said subcarriers of interest).

With respect to claims 4, 15, and 22, Kadous discloses on page 3, 32nd paragraph and Fig.

2, that the least square (LS) channel estimate (pilot vector) is then determined by performing

division on the training sequence (pilot symbols) in LS estimator 56 (generating a pilot vector

includes using all pilot symbols within OFDM symbol).

With respect to claims 5, 14, 18, 23, and 28, Kadous discloses on page 2, 20th paragraph, that the interpolation coefficient is determined by estimating maximum delay, calculating maximum number of multipaths by dividing maximum delay by the transmitted symbol duration, creating a CMPP, and performing a FFT on CMPP to generate a frequency correction factor which is used to determine an interpolator coefficient in the form of an interpolator matrix M(herein, interpolation vectors that each have a length that is equal to the pilot vector). Herein, the matrix is stored for further used in calculating channel estimate (obtaining a first interpolation vector includes selectively retrieving first interpolation vector from a memory).

With respect to claims 6, 10, 20, and 26, Kadous discloses in Fig. 1, a functional block diagram illustrating portions of an orthogonal frequency division multiplexing (OFDM) receiver 100. Herein, a signal r(t) is received, synchronized, corrected, deinterleaved, and decoded. It should be understood that in an OFDM system, a signal r(t) or OFDM symbol comprises a plurality of data symbols modulated by different subcarriers and plurality of pilot symbols. Herein, one or more subcarriers are assigned to a subscriber for modulating the data symbols (identifying subcarriers of interest includes identifying subcarriers associated with a first user within the communication system).

With respect to claims 11-13, Kadous discloses in Fig. 1, a functional block diagram illustrating portions of an orthogonal frequency division multiplexing (OFDM) receiver 100 (communication device is a portable communicator, a base station, or a wireless OFDM receiver).

Conclusion

2.   The prior art made of record and not relied upon is considered pertinent to applicant's

disclosure.

Vook et al (US Patent No. 6,765,969 B1) discloses method and device for multi-user

channel estimation.

Sudo (US Patent No. 6,625,111 B1) discloses OFDM communication apparatus.

Siala et al (US Patent No. 6,768,713 B1) discloses OFDM receiver with iterative channel

estimation and a corresponding method.

3.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Anh-Vu H Ly whose telephone number is 571-272-3175. The

examiner can normally be reached on Monday-Friday 7:00am - 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Chi Pham can be reached on 571-272-3179. The fax phone number for the

organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

CHI PHAM
SUPERVISORY PATENT EXAMINER
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